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# Study of growth temperature effect on wetting layer during In/GaAs droplet epitaxy

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Controlling the characteristics of nanostructures is a key task for improving the functional parameters of existing devices based on semiconductor heterostructures. Droplet epitaxy, due to the separate deposition of components, allows to significantly expand the possibilities in the field of control and variation of the parameters of the obtained nanostructures. However, the formation of a wetting layer during the deposition of metal droplets still insufficiently studied.

In this paper we present the results of the experimental investigation of temperature dependence of wetting layer formation during droplet epitaxy of In/GaAs(001) nanostructures grown at various temperatures and deposition thicknesses using X-ray photoelectron spectroscopy technique.

From the presented data (Figure 1a,b) it is clear that the intensity of the In3d5A line on curve 1 (low-temperature sample without droplets) drops to zero much earlier than the lines on curve 2 (high-temperature sample with droplets) – by 360 s and 840 s, respectively. This may indicate a different thickness of the deposited material on the samples (a change of 2 times). The conventionally monotonous nature of the decrease in the intensity of the In3d5A spectral line in the first case indirectly indicates the relatively homogeneous structure of the In wetting layer. The complex nature of the intensity curve in the second case is due to the complex structure on the surface. It should be noted that the 3-fold difference in this case also correlates with the previously obtained experimental data [1].

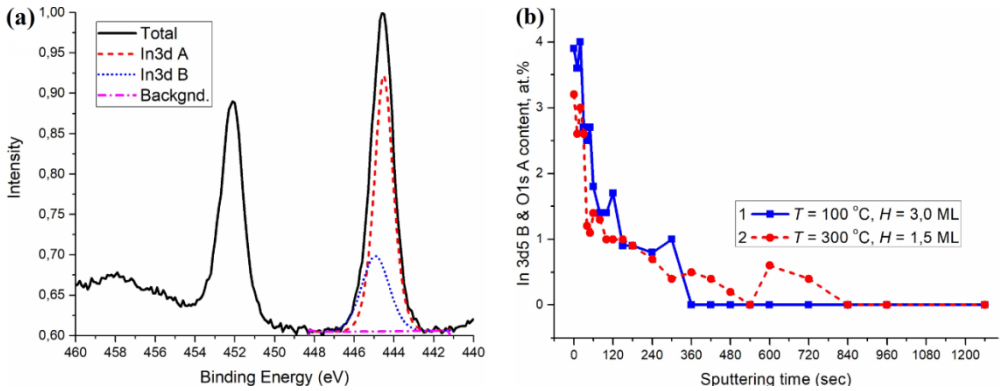


Figure 1. (a) XPS spectra from samples obtained at $T = 100$ °C, $H = 3$ ML and $T = 300$ °C, $H = 1.5$ ML and (b) change of In3d5A line intensity during etching of sample surfaces.

The results of X-ray photoelectron spectroscopy of In/GaAs samples formed under different conditions confirm an increase in the wetting layer thickness with a decrease in the formation temperature of the systems.

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1. S.V. Balakirev, M.S. Solodovnik, O.A. Ageev, *Phys. Status Solidi B* **255**, 1700360 (2018).